A Transcriptomic Severity Classifier IMX-SEV-3b to Predict Mortality in Intensive Care Unit Patients with COVID-19: A Prospective Observational Pilot Study

INTRODUCTION
The prediction of disease outcomes in COVID-19 patients in the ICU is of critical importance, and the examination of host gene expressions is a promising tool. The 29-host mRNA Inflammatix-Sever-3b (IMX-SEV-3b) classifier has been reported to predict mortality in emergency department COVID-19 patients and surgical ICU patients. The accuracy of the IMX-SEV-3b in predicting mortality in COVID-19 patients admitted to the ICU is yet unknown.

OBJECTIVES
Our aim was to investigate the accuracy of the IMX-SEV-3b in predicting the ICU mortality of COVID-19 patients. In addition, we assessed the predictive performance of routinely measured biomarkers and the Sequential Organ Failure Assessment (SOFA) score as well.

METHODS
• This was a prospective observational study enrolling COVID-19 patients who received mechanical ventilation on the ICU of the Erasmus MC, the Netherlands.
• The IMX-SEV-3b scores were generated by amplifying 29 host response genes from peripheral blood collected in PAXgene® Blood RNA tubes.
• A severity score was provided, ranging from 0 to 1 for increasing disease severity.
• The primary outcome was the accuracy of the IMX-SEV-3b in predicting ICU mortality, and we calculated the AUROC of the IMX-SEV-3b score, the biomarkers CRP, D-dimer, ferritin, leukocyte count, IL-6, LDH, NLR and PCT for prediction of ICU mortality was 0.81 (IQR 0.69–0.93). The specificity of the ‘rule-in’ very high, high and moderate interpretation bands was, respectively, 100%, 94% and 74%, and the sensitivity of the ‘rule-out’ very low and low interpretation bands was 100% and 56% (table 3).

CONCLUSIONS
In this observational pilot study, the mean IMX-SEV-3b score of the 29-gene host response classifier was significantly lower (0.58) in survivors compared to non-survivors (0.66) in ICU patients with COVID-19.

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